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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/777,033	02/11/2004	Anna Lee Tonkovich	VELOP0115US	2195
56319 7590 03/05/2009 NEIL A. DUCHEZ (VELOCYS) RENNER, OTTO, BOISSELLE & SKLAR, LLP 1621 EUCLID AVENUE 19TH FLOOR CLEVELAND, OH 44115				
EXAMINER WARTALOWICZ, PAUL A				
ART UNIT 1793		PAPER NUMBER		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/777,033

Applicant(s)

TONKOVICH ET AL.

Examiner

PAUL A. WARTALOWICZ

Art Unit

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 December 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-78 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-78 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SE/US)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 12/12/08 have been fully considered but they are not persuasive.

The rejection over WO '346 has been withdrawn. Therefore, arguments regarding that rejection are moot.

Applicant argues that the Examiner admits that Ward does not teach the formation of an intermediate product composition and that Ward does not disclose the use of a first reaction zone and a second reaction zone in the same process channel.

However, as explained in the rejection, O'Rear teaches a substantially similar process as Ward such that one of ordinary skill in the art would recognize that an intermediate would be formed in Ward because O'Rear teaches that an intermediate is formed in a process that is substantially similar to the process of Ward.

Regarding the limitation of a first reaction zone in the same process microchannel as a second reaction zone wherein the first reaction zone and the second reaction zone are separated by a non-reactive zone, Ward is not relied upon to teach this limitation. Tonkovich is relied upon to teach a microchannel reactor configuration wherein a heat exchanger is disposed between two reactors within a singular process microchannel.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections

are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that Ward does not teach 75-95% conversion of CO in the first reaction zone and the conversion of CO in another reaction zone from about 75-95%.

However, at page 14, lines 14-17, Ward teaches 90% conversion for each reactor. This teaches that each singular reactor has a conversion rate of 90% such that 90% conversion would occur in the first reactor and a conversion rate of 90% would take place in another reactor.

Applicant argues that O'Rear discloses a dual functional syngas conversion wherein syngas is converted to products via a methanol intermediate and that two different types of catalysts are used.

However, Ward teaches that the catalyst can be any catalyst or combination of catalysts appropriate for the reaction of interest. This suggests that the catalyst in the different reaction zones can be the same catalyst or different catalysts based on the reaction of interest.

Additionally, O'Rear is not relied upon to teach a multi-step process conducted in a microchannel reactor wherein a first reaction is conducted in a first reaction zone to form an intermediate product composition, another reaction is conducted in another reaction zone to form a final product, and the first reaction zone and the second reaction

zone are separated by a non-reactive zone wherein the intermediate product composition is heated or cooled. O'Rear is relied upon to teach that it would be obvious to produce an intermediate product in a process where there are two different catalysts.

Applicant argues that Van Egmond does not teach a multi-step process conducted in a microchannel reactor wherein a first reaction is conducted in a first reaction zone to form an intermediate product composition, another reaction is conducted in another reaction zone to form a final product.

However, Van Egmond is not relied upon to teach a multi-step process conducted in a microchannel reactor wherein a first reaction is conducted in a first reaction zone to form an intermediate product composition, another reaction is conducted in another reaction zone to form a final product. Van Egmond is relied upon to teach the temperature of the reaction zones with regard to instant claim 1. Claim 74 does require a temperature. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that Brophy is not prior art because Brophy and the present application are assigned to the same company.

However, the test under 103(c) is whether the application and Brophy were commonly owned at the time of invention.

35 USC 103 (c) states: Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the claimed invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Applicant argues that Tonkovich '536 does not teach a process microchannel containing two reaction zones separated by a non-reactive zone as specified in the independent claims.

However, Tonkovich '536 is not relied upon to teach a process microchannel containing two reaction zones separated by a non-reactive zone as specified in the independent claims. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that Guillard does not teach a method wherein dimethyl ether is produced in both reaction stages.

However, this argument is moot in view of the new rejection over Shikada.

Applicant argues that Schmidt does not teach a process microchannel containing two reaction zones separated by a non-reactive zone as specified in the independent claims.

However, Schmidt is not relied upon to teach a process microchannel containing two reaction zones separated by a non-reactive zone as specified in the independent claims. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that Tonkovich '505 is not prior art because Tonkovich '505 and the present application are assigned to the same company.

However, the test under 103(c) is whether the application and Tonkovich '505 were commonly owned at the time of invention. *Supra*.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-73, 75-78 with respect to claims 1-9, 13-55, 57, 60-73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ward et al. (WO 03/078052) in view of Van Egmond (U.S. 2004/0127759) and either O'Rear (6703429) or Reyes (6726850) and either Brophy (7294734) or Wainwright (4366260) and Tonkovich (6200536).

Ward teach a process for methanol synthesis (page 27) wherein the reactions are equilibrated to 90% conversion (page 13) and wherein sequential reactors are used in the process (page 26). Ward additionally teach or suggest limitations including another reaction temperature in a second step is lower than the reaction temperature in a first step (page 13), thee dimensions of the microchannel (page 9), counter-current relationship of fluid of microchannel with heat-exchange channel (page 15).

Ward fail to teach that an intermediate is formed in a first reaction zone with a first catalyst and a final product is formed in a second reaction zone.

O'Rear teach a process for methanol synthesis wherein an intermediate is formed in a first reaction zone with a first catalyst and a final product is formed in a second reaction zone (col. 5).

Reyes teach a multistage process (col. 1) wherein multiple stages are carried out wherein the intermediate product is transported to the next stage wherein all the stages comprise a partial oxidation catalyst (col. 3-4)

It would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide wherein an intermediate is formed in a first reaction zone with a first catalyst and a final product is formed in a second reaction zone in Ward because both documents are drawn to the substantially similar method of methanol synthesis (O'Rear, col. 5) or partial oxidation (Reyes, col. 3-4) as taught by O'Rear and Reyes.

Ward additionally fail to teach the temperature of the process.

Van Egmond teach a process for methanol synthesis [0001] wherein the methanol synthesis reaction temperature is in the range of 150-450°C [0086].

It would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide the methanol synthesis reaction temperature is in the range of 150-450°C in Ward because both documents are drawn to the substantially similar method of methanol synthesis as taught by Van Egmond.

Ward fail to teach limitations including reaction time and pressure.

Brophy teach a method for methanol synthesis (col. 34) wherein a claimed pressure and contact time are employed.

It would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide a claimed pressure and contact time are

employed in Ward because the two disclosures are drawn to a similar process of methanol synthesis as taught by Brophy.

Additionally, Wainwright teach that it is known that using specific catalysts are capable of producing both methanol and dimethyl ether depending on conditions of reactions such as contact time and pressure (col. 6-7).

Therefore, it would have been obvious to vary conditions such as contact time and pressure in Ward in order to produce the desired end product such as methanol and dimethyl ether (col. 6-7) as taught by Wainwright.

Thus, the claimed values for pressure and contact time would be obvious based on the teaching in Wainwright that it is known to vary conditions of reactions such as contact time and pressure (col. 6-7) to produce either methanol or dimethyl ether.

Ward fails to teach the reaction zones are separated by a non-reactive zone, the first reaction zone and another reaction zone being in the same process microchannel.

Tonkovich teach a microchannel reactor configuration (col. 1) wherein a heat exchanger is disposed between two reactors within a singular process microchannel (fig. 2d, col. 4).

It would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide heat exchangers is disposed between two reactors in Ward in order to provide an apparatus for substantially similar processes as taught by Tonkovich.

Additionally, it appears that Tonkovich is silent with respect to whether there is catalyst in the heat exchanger chamber (fig. 2d, 220). However, catalyst is sometimes

added to exothermic chamber (100). One of ordinary skill in the art at the time applicant's invention was made would recognize that there is no catalyst present in the heat exchanger zone of Tonkovich because a catalyst coating is only mentioned regarding the exothermic chamber.

As to claims 75-77, it appears that the prior art teach a substantially similar process as that of the claimed invention such that the properties of the prior art are substantially similar to that of the claimed invention including SLPM and contact time of the reactants.

Claim 74 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ward (WO 03/078052) in view of either O'Rear (6703429) or Reyes (6726850) and either Brophy (7294734) or Wainwright (4366260) and Tonkovich (6200536) and Shikada (6562306).

Ward teach a process for methanol synthesis (page 27) wherein the reactions are equilibrated to 90% conversion (page 13) and wherein sequential reactors are used in the process (page 26). Ward additionally teach or suggest limitations including another reaction temperature in a second step is lower than the reaction temperature in a first step (page 13), the dimensions of the microchannel (page 9), counter-current relationship of fluid of microchannel with heat-exchange channel (page 15).

Ward fail to teach that an intermediate is formed in a first reaction zone with a first catalyst and a final product is formed in a second reaction zone.

O'Rear teach a process for methanol synthesis wherein an intermediate is formed in a first reaction zone with a first catalyst and a final product is formed in a second reaction zone (col. 5).

Reyes teach a multistage process (col. 1) wherein multiple stages are carried out wherein the intermediate product is transported to the next stage wherein all the stages comprise a partial oxidation catalyst (col. 3-4)

It would have been obvious to one of ordinary skill in the art at the time applicant's invention was made wherein an intermediate is formed in a first reaction zone with a first catalyst and a final product is formed in a second reaction zone in Ward because both documents are drawn to the similar method of methanol synthesis (O'Rear, col. 5) or partial oxidation (Reyes, col. 3-4) as taught by O'Rear and Reyes.

Ward fail to teach limitations including reaction time and pressure.

Brophy teach a method for methanol synthesis (col. 34) wherein a claimed pressure and contact time are employed.

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide a claimed pressure and contact time are employed in Ward because the two disclosures are drawn to a substantially similar process of methanol synthesis as taught by Brophy.

Additionally, Wainwright teach that it is known that using specific catalysts are capable of producing both methanol and dimethyl ether depending on conditions of reactions such as contact time and pressure (col. 6-7).

Therefore, it would have been obvious to vary conditions such as contact time and pressure in Ward in order to produce the desired end product such as methanol and dimethyl ether as taught by Wainwright.

Thus, the claimed values for pressure and contact time would be obvious based on the teaching in Wainwright that it is known to vary conditions of reactions such as contact time and pressure to produce either methanol or dimethyl ether.

Ward fail to teach a method of making dimethyl ether.

Ward teach a method of carrying out exothermic reactions.

Shikada teach a method of making dimethyl ether (col. 1) wherein carbon monoxide and hydrogen are flowed through a two reactor process wherein dimethyl ether is produced in both reactors (col. 4)

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide wherein carbon monoxide and hydrogen are flowed through a two reactor process wherein dimethyl ether is produced in both reactors in Ward because the process of making dimethyl ether takes place in two reactors as taught by Shikada.

Claims 75-77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ward (WO 03/078052) in view of Van Egmond (U.S. 2004/0127759) and O'Rear (U.S. 6703429) and Brophy (U.S. 7294734) and Tonkovich (U.S. 6200536) and either one of Tonkovich (U.S. 6969505) or Schmidt (U.S. 6452061)

Ward teach a method as described above.

If Ward fails to teach the limitations of claims 75-77, Tonkovich teach the claimed limitations (col. 13) for the purpose of optimizing an exothermic reaction.

Schmidt teach a method of oxidation of hydrocarbons (col. 1) wherein the claimed SLPM and contact time is known for conversion reactions (col. 7).

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide the claimed SLPM and contact time in Ward because these reaction conditions are well known as taught by Tonkovich and Schmidt.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PAUL A. WARTALOWICZ whose telephone number is (571)272-5957. The examiner can normally be reached on 8:30-6 M-Th and 8:30-5 on Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Paul Wartalowicz
February 27, 2009

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